

4.2.5.5 Geology and Soils

Construction and operation of the alternatives at ORR would have no impact on the geological resources identified. A low seismic risk exists, but would be considered in the design of the proposed alternatives. The existing seismic risk does not preclude the safe construction and operation of the proposed alternative facilities. The facilities would be designed for earthquake-generated ground acceleration in accordance with DOE O 420.1, *Facility Safety*. Because there are no known capable faults at ORR, ground rupture as a result of an earthquake during the life of the facility is minimal; ground shaking is more likely to occur. Intensities of more than VI on the MMI scale are not likely at ORR. Ground shaking could affect the integrity of inadequately designed (older) or nonreinforced structures but would not affect newly designed or modified facilities. Human health effects from accidents initiated by natural phenomena (for example, earthquakes) are discussed in Section 4.2.5.9. Volcanic activity is improbable during the life of an alternative and is not anticipated to affect the construction and operation of the alternatives. It is also unlikely that landslides or other nontectonic events would affect the proposed alternatives. Slopes and underlying foundation materials are generally stable. Sinkholes are present in the Knox Dolomite, however the Knox Dolomite is not present in Bear Creek Valley or proposed alternative areas. Properties and conditions of soils underlying ORR typically have no limitations on construction. No economically viable geological resources are known to be present at ORR.

Impacts to the geological and soil resources occur during, or as a result of, ground-disturbing construction activities. Construction of the alternatives may involve ground-disturbing activities that could affect the soil resources. The amount of land disturbed is specified below for each alternative. Effects to the soil resource would depend on the specific soil units in the disturbed area, the extent of land-disturbing activities, and the amount of soil disturbed. Within ORR, the soil erosion potential is directly related to the amount of land disturbed because soil and climatic conditions are similar throughout the site. Control measures would be employed to minimize soil erosion.

No Action Alternative

[Text deleted.] Under the No Action Alternative, DOE would continue current and ongoing activities at ORR. There would be no ground-disturbing activities beyond those associated with existing and future site improvements. Because no new construction and the associated ground disturbance for potential soil erosion would occur, the No Action Alternative would have no effect on geologic or soil resources at the site.

Upgrade Alternative

Preferred Alternative: Modify Existing Y-12 Plant for Continued Highly Enriched Uranium Storage

Because no new ground-breaking construction activities are planned under this alternative, no construction or operational effects to geologic or soil resources are anticipated.

Collocation Alternative

Construct New Plutonium Storage Facility; Maintain Existing Highly Enriched Uranium Storage Facilities at Y-12 Plant

Construction of the new Pu storage facility will occur on undisturbed land, as described in Section 4.2.5.1. During construction approximately 58.5 ha (144 acres) would be disturbed. Soil disturbance would occur primarily from ground-disturbing construction activities (foundation preparation) and activities associated with building construction laydown areas that can expose the soil profile and lead to a possible increase in erosion as a result of wind and water action. Soil losses would depend on the frequency and severity of storms; wind velocities (increased wind velocities and duration can increase soil erosion potential); and the size, location, and duration of ground-disturbing activities with respect to local drainage and wind patterns.

Net soil disturbance during operations would be considerably less than during construction because areas temporarily used for construction laydown would be restored. Although stormwater runoff and wind action could occur occasionally during operations, they are anticipated to be minimal. [Text deleted.]

Construct New Plutonium Storage Facility and Modify Existing Highly Enriched Uranium Storage Facilities at Y-12 Plant

No apparent direct or indirect effects on the geologic resources are anticipated, because neither facility construction and operational activities nor site infrastructure improvements will restrict access to potential geologic resources.

Construction and operation effects on geology and soil resources for this option would be similar to those described for the new Pu storage facility and maintain existing HEU storage option. [Text deleted.] Construction of the new Pu storage facility for this subalternative would occur on undeveloped land, as described in Section 4.2.5.1. Approximately 58.5 ha (144 acres) would be disturbed for the new facilities, affecting the soil profile and leading to a possible temporary increase in erosion as a result of stormwater runoff and wind action. Soil impacts during operation are expected to be minimal.

Construct New Plutonium and Highly Enriched Uranium Storage Facilities

No apparent direct or indirect effects on the geologic resources are anticipated, because neither facility construction and operational activities nor site infrastructure improvements will restrict access to potential geologic resources.

Construction and operation effects on geology and soil resources for this option would be similar to those described for the new Pu storage facility and maintain existing HEU storage option. Construction of these facilities would occur completely on undisturbed land, as described in Section 4.2.5.1. Additional soil impacts would be anticipated because this option has the greatest construction and operations land use. Approximately 89.5 ha (221 acres) would be disturbed for construction of the new facilities, affecting the soil profile and leading to a possible temporary increase in erosion as a result of stormwater runoff and wind action. Soil impacts during operation are expected to be minimal.

Subalternatives Not Including Strategic Reserve and Weapons Research and Development Materials

Excluding strategic reserve and weapons R&D materials would give almost the same effects to the geologic and soil resources for the No Action Alternative, the Upgrade Alternative, and the Collocation Alternative. By excluding these materials, the size of a facility would be similar, thus not changing the amount of land disturbed by construction activities. No effect to the geological resource is anticipated as a result of this subalternative.

Phaseout

The phaseout of storage capacity would have no apparent effects on the geology resources. However, phaseout could result in beneficial effects in the soil of the area. Hazardous, radioactive, and mixed waste sources would be eliminated from the area, thus decreasing the potential for future soil contamination.

[Text deleted.]